

Submitted by: Paul Meyers, Julia Butler Hansen Refuge for Columbian White-tailed Deer,
Willipa National Wildlife Refuge Complex

Contact information: Julia Butler Hansen NWR

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1. Project Title: Groundwater monitoring at the Julia Butler Hansen NWR
2. Primary Responsible Individual: Paul Meyers
3. Project objective(s): Deploy groundwater monitoring stations to detect changes in groundwater levels due to sea-level rise.
4. Methods: Four long-term monitoring stations will be created on the Julia Butler Hansen Mainland. These stations will consist of holes dug to groundwater level and lined with a perforated PVC pipe. This pipe will be cemented in place and fitted with a cover. A water-level monitoring logger will be attached inside. A data cord from this logger will be accessible at the surface level so that logged information can be downloaded to a PC at 4-month intervals.
5. Timeline: Installation of these loggers will occur during summer 2012. Monitoring will continue immediately after installation. Funding is requested for the purchase of equipment for these stations only. Subsequent monitoring will be performed by the refuge. Monitoring of this data will continue over the next 10–20 years.
6. Funding Priorities:
6, Evaluate effects of climate change. Much of the JBH Mainland unit is wetland habitat with groundwater just beneath the soil surface. The area is under tidal influence, with tides ranging from –1 to 9 feet. The area is protected by a dike which prevents inundation of the area, but is permeable to the slow seepage of water. If sea level increases over time, we could see an increase in groundwater levels due to a general rise of the Columbia River as it backs up from the coast. Increased groundwater would increase wetland habitat at the refuge, which could, in turn, change the distribution of vegetation throughout the unit. This scenario would likely increase the spread of reed canary grass (*Phalaris sp.*) and other invasive plants. Our ability to document changes in groundwater levels will enhance our ability for proactive management.

5, Purchase of equipment. We wish to purchase water sensors and downloadable data loggers.

1, Inventory Project/Collection of baseline data. Changes in groundwater levels have not been collected in the past, and we wish to create a baseline measurement.

2, Adaptive Management—evaluate effectiveness of management actions. If groundwater is increasing, there is a need to alter our vegetation management strategy. Changes in groundwater levels would affect the types of vegetation we can manage, the timing of planting, and the area of the refuge we can successfully plant. In addition, this information would inform us as to the need of attempting to raise the soil level on managed fields. Ideally, we could assess the rate of increase and plan accordingly.

7. Project justification: The primary purpose of the Julia Butler Hansen NWR is the preservation of the endangered Columbian White-tailed deer. The refuge is only slightly above sea level and experiences tidal inflow due to backup of the Columbia River. Groundwater is at the soil surface in some areas and just below the soil surface in others. A small increase in groundwater levels could alter the vegetation over much of the refuge and increase the difficulty of maintaining adequate forage. Reed canary grass thrives in wet climates, and our ability to control it depends on small elevational differences that affect soil drainage. Currently, there is enough upland habitat to support adequate deer numbers. If this habitat becomes inundated, food resources will decline.
8. Refuge decision making: Our current habitat plan centers around restoration of adequately drained soils. When groundwater increases, these soils become harder to work and less able to maintain the desired vegetative component. Careful monitoring of groundwater levels will inform us of whether action needs to be taken to find alternative fields or raise field elevation.

9. Statistical or GIS support needed: None

10. Requested funding:	4 water level sensors (\$600 each):	\$2400
	4 water level loggers (\$1000 each):	\$4000
	4 accessories (cables, caps, etc--\$100 each):	\$ 400
	Misc (cement, pipe, fittings, etc):	\$ 700
	Total	\$7500